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INTERIM ENVIRONMENTAL GUIDELINES FOR THERMAL POWER PLANT SITE EVALUATION-PACIFIC NORTHWEST

DEPARTMENT OF THE INTERIOR

JULY 1970

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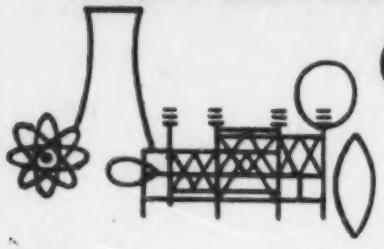

FOR THERMAL POWER PLANT SITE EVALUATION-PACIFIC NORTHWEST

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United States Department of the Interior

OFFICE OF THE SECRETARY
PACIFIC NORTHWEST REGION
P.O. Box 3621, Portland, Oregon 97208

July 21, 1970

Memorandum

To: Field Committee Members
Messrs. Agee, Baldwin, Findlay, Hastings, Johnson, Nelson, Overly, Peterson, Ratcliffe, Richmond, Rutter, Wright

From: Regional Coordinator

Subject: Interim Environmental Guidelines for Thermal Power Plant Site Evaluation -- Pacific Northwest

Meeting the electric power needs of the Pacific Northwest while at the same time protecting our regional ecological, recreational, aesthetic, and archeological heritage is a challenge to our society.

These interim guidelines were prepared by the Interior agencies of the region, working through my office, to assist in meeting this challenge by evaluating the effects of thermal power plants at specific sites upon the aquatic and terrestrial environment within the scope of the Department's responsibilities. The agencies and individuals involved are to be commended for their ability in reaching a common end in preparing these guidelines where a variety of differing and sometimes almost opposing responsibilities are represented.

These interim guidelines must be continually reviewed, evaluated, and revised to keep step with technological changes, the ever new and growing knowledge of the effects of the industry on our environment, and the public needs. Some parts of the guidelines will be expanded--in particular, the area covering land use for transmission systems. It is proposed to prepare separate guidelines on transmission systems in cooperation with the Interior agencies and the Forest Service.

These interim guidelines point the way but they are not rigid rules to be blindly followed. Common sense must be used in applying them to any specific site or situation.

Field Committee Members July 21, 1970

It will not be possible to fully comply with all the time schedules and other items of the guidelines in the case of site studies for projects currently underway. Concurrent actions on studies and plant designs will be required to keep in step with regional power and environmental needs.

These guidelines are respectfully submitted.

L. B. Day

Attachment
cc:
Assistant Secretaries
Dole, Glasgow, Klein,
Loesch, Smith
Solicitor Melich
Mr. Ryan/Attention Mr. W. W. Lyons
Messrs. Burroughs, Cleaver, Kapustka

DEPARTMENT OF THE INTERIOR

INTERIM ENVIRONMENTAL GUIDELINES FOR THERMAL POWER PLANT SITE EVALUATION

- PACIFIC NORTHWEST -

July 20, 1970

DEPARTMENT OF THE INTERIOR

INTERIM ENVIRONMENTAL GUIDELINES FOR THERMAL POWER PLANT SITE EVALUATION - PACIFIC NORTHWEST -

July 20, 1970

INTRODUCTION

These interim guidelines were prepared by the Department of the Interior agencies in the Pacific Northwest (Oregon, Washington, Idaho, and those parts of Montana and Wyoming west of the Continental Divide), working through the Regional Coordinator, to assist in evaluating the effects of thermal power plant site selection upon the aquatic and terrestrial environment within the scope of the Department's responsibilities. It is anticipated that additional or revised guidelines will be developed as environmental issues are more clearly defined.

As detailed analyses of land use and other studies are completed, the Pacific Northwest States may choose to designate areas within their State boundaries that would be unacceptable environmentally for power plant development, and eventually the States may designate areas that are the most suitable. However, at present such information does not exist and each site must be judged on its own merits.

Thermal power plant siting, policies, and studies require adequate considerations of the ecosystem, as well as site safety and construction and operation economics. Early coordination of thermal power plant studies with local, State, and Federal agencies is now required in light

of current Federal and State legislation and regulations and the emphasis being placed on environmental quality.

The National Environmental Policy Act of 1969, Public Law 91-190, provides a major impetus for the actions recommended in these guidelines. This Act requires all agencies of the Federal Government, in considering actions that significantly affect the quality of the human environment, to prepare a statement on:

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Nuclear power plants must be licensed for operation by the Atomic Energy Commission. Sponsors of nuclear- and fossil-fueled power plants in the Northwest must obtain permits for water withdrawal and waste discharge from the appropriate State regulatory agencies. Permits must also be obtained from the Corps of Engineers for construction of power plant facilities, such as intakes and outfalls, which project into or discharge into navigable waterways.

The National Environmental Policy Act and other legislation require that Federal licensing and permitting agencies consider the environmental impact of a proposed facility or activity. These agencies are required to seek the views of the Department of Interior as to these matters. Although the Department of the Interior does not exercise a licensing or permitting responsibility, Sec. 21(b) of the Water Pollution Control Act, as amended, prescribes the procedures which the sponsoring utilities and State and Federal agencies must implement towards assuring the Federal licensing and permitting agencies (AEC and USACE) that the applicable Interstate Water Quality Standards will be met by proper location, design, and operation of the power plant facilities.

Several agencies of the Department of the Interior in the Pacific Northwest have legislative and administrative responsibilities for making evaluations on the environmental impact of proposed thermal power plants. As appropriate, the Regional Coordinator, USDI, assembles a task force of interested Interior agencies to coordinate these evaluations. A lead agency for each task force is designated by the Regional Coordinator and has the responsibility for communications, meeting schedules, information distribution, and development of task force recommendations on site acceptability. These recommendations are reviewed by the several Northwest Interior agency directors and incorporated into a coordinated site evaluation response to the utility. During the task force studies of available data, a working relationship is maintained with other concerned Federal agencies and with State agencies and power plant siting councils. Task force action, however, does not release the Interior agencies from their individual responsibilities.

Where available data and/or techniques are inadequate to define the impact of power plant construction and operation upon the aquatic and terrestrial environment, the Department of the Interior will favor protection of the overall environment. The Interior agencies in the Northwest have neither the responsibility nor resources to conduct studies on specific thermal power plant sites. Consequently, the sponsoring utilities must provide much of the data necessary for these evaluations. If the pre-site selection and preliminary site evaluation studies are properly designed, coordinated, and conducted, much of the data compiled will be useful during subsequent pre-construction studies. The need for preliminary studies to satisfy environmental impact evaluation needs should not significantly increase the total cost or time required between multiple site investigations and completion of power plant construction.

PRE-SITE SELECTION STUDIES

Consideration of any area or specific sites for the location of a thermal power plant requires certain minimum qualifications. During the time period when utilities are investigating multiple sites for thermal power plant locations, considerations, such as general compliance with AEC regulations in the case of nuclear plants, and applicable Water Quality Standards must be covered. Once these qualifications have been met and the necessary data assembled, contact should be made with the interested State and Federal agencies to work with them in detailing the preliminary site evaluation data needs that will lead to the securing of necessary permits and licenses.

The siting of any industrial plant requires that many factors be considered in arriving at a decision that best satisfies the objectives. The cost of land, site preparation, construction costs, operating costs, and transportation costs are typical economic variables. The public's acceptance of a new plant is an intangible factor that must be considered. In some cases public acceptance may outweigh more tangible economic factors.

Thermal power plant site location, design, and operation have certain more specific considerations as follows:

1. The discharge of surplus heat is presently from about one-half to two-thirds of the total heat generated in the power cycle. This surplus heat must be used beneficially or wasted, and its potential effect on the environment is an important consideration.
2. Releases to the atmosphere from both nuclear and fossil-fueled power plants.
3. Sufficient land of suitable topography for the proposed power plant.
4. Adequate water supply for power-plant makeup, domestic services, and for use in the cooling processes. At marine sites where fresh water is not available, distilled water can be obtained from sea water for power-plant makeup and for domestic services.
5. Geologic history, character of foundation strata, and nearest fault location.
6. Estimate of the effects of catastrophic phenomena (tsunamis, storms, slides, flood, earthquakes, dam failure, human error);

and, based on this estimate, a plant design to provide the requisite degree of security from flood, earthquake, upstream catastrophe, and loss of primary cooling facilities.

7. Consideration of thermal effect on receiving water and its biota.
8. Proximity to transportation (road, rail, air, water).
9. Proximity to the main power transmission grid or availability of routes for new transmission lines.
10. Proximity to load centers.
11. Ease with which site can accommodate multiple power units and maximum number that might be considered there.
12. Capability of blending the plant with surrounding landscape.
13. Land zoning which allows utilization for a thermal power plant or where there is reasonable assurance that zoning authority will reclassify for such use.

PRELIMINARY SITE EVALUATION DATA NEEDS

The Interior agencies in the Northwest Region have defined certain data as necessary for satisfactory evaluation of thermal power plant sites, relative to applicable water quality and land use standards and policies. The needed data must be provided and evaluated by the utilities with respect to effects on the aquatic environment and terrestrial resources in their site selection report. Associated field studies must include at least two years of measurements acceptable to the State and Federal regulatory agencies. It is suggested that the sponsoring utilities meet with the Interior agencies at their earliest opportunity to

discuss interpretation and possible modifications of these data needs towards optimizing the field studies relative to characteristics of specific sites.

The following general site characteristics are prerequisite to the protection of the aquatic environment and water resource users:

1. Marine sites considered by the utilities must be located to minimize adverse effects on major shellfish and fin fish resources.
2. Site characteristics must be amenable to compliance with applicable Water Quality Standards.
3. Adequate water depth must be available at the site so that power plant intakes do not endanger aquatic organisms near the water surface.
4. The area of concern in the aquatic environment will be at most a three-to-five-mile radius from the power plant intake or outfall unless special circumstances require additional area coverage.

Marine Sites. Evaluation of coastal sites and sites in the marine areas of Puget Sound require the data outlined below.

1. Power Plant Data
   a. Specific location of the site.
   b. Description of other important water uses within three to five miles of the probable power plant intake or outfall locations.

c. Generating capacity (initial and ultimate); projected power generation schedules for representative years over the expected life of the project.

d. Fuel used and thermal efficiency.

e. Power plant intake/outfall design and location; also, screening and fish bypass facilities, cooling water pump types and sizes, and condenser cooling line sizes.

f. Cooling water requirements for alternate modes of waste heat treatment. Information should be presented to show that potential avenues for waste heat utilization have been seriously considered.

g. Treatment requirements for plant makeup water, if any.

h. Mode of fouling control in the intake/outfall conduits, the condenser cooling water lines, and the waste treatment facility.

i. Description of physical and chemical characteristics of general plant wastes, other than condenser cooling water, including methods of handling and disposal.

2. Physical Oceanographic Data

The utilities are expected to calculate the mixing characteristics of discharges from the power plant outfall(s) and present the data, methods of calculation, and results in their preliminary site selection report.

a. Determinations of surface area and total volume of water affected by outfall discharges. Also, determinations of

the mass transport of the warm water field as a function of time (viz., flushing characteristics).

These calculations will be made for critical conditions of tide, slack current, weather, and possible influence of fresh water flows.

b. Bottom contours (depth below MLLW) within three to five miles of the probable power plant intake or outfall locations.

c. Tidal characteristics, daily and seasonal (i.e., ranges of depth with time).

d. Ambient currents within the area of concern: (1) direction and strength of the current as functions of time, tides, offshore currents, wind conditions, and possible influence of fresh water flows; (2) occurrence and duration of periods of minimum current; (3) occurrence and duration of periods of upwelling.

e. Ambient water temperatures within three to five miles of the power plant intake/outfall. In developing these data, it is important to note that the Water Quality Standards for coastal waters apply at least to the three-mile limit and to the entire water column.

Specifically, surface isotherm maps, accurate to at least 1° F., are needed and should define temperature changes diurnally and seasonally. Temperature profiles are needed at one-half mile grid intervals within the three-to-five-mile study area, and should define

variations with time. Finally, a continuous record of temperature is needed for one profile near the proposed power plant outfall. It is expected that these continuous records will show the influence of nearshore current movement, upwelling, and other phenomena of mass water transport on water temperatures at a point.

f. Salinity profiles are also needed at one-half mile intervals to complete evaluation of receiving water density characteristics with time.

3. Meteorological Data

The following continuous records will be required at the plant site over a period of two years, for correlation with long-term regional data: wind speed and direction, air temperature, dewpoint, and solar radiation.

4. Biological Data

Careful documentation of the receiving water biota is essential, since the Water Quality Standards for coastal waters were developed largely upon the need for preservation of marine organisms.

a. An inventory of pelagic and benthic organisms identified at least to genera is required within three to five miles of the thermal power plant intake/outfall. Emphasis should be placed on pelagic organisms and results presented in terms of estimated percent distribution and relative abundance of the important genera. These data should be taken to describe vertical and horizontal distribution

and should coincide with general location of planned intake and outfall structures.

b. The distribution and time of residency of migratory or transient species and forms should be identified as a distinct part of the inventory.

c. Biologic surveys will be required throughout the year in order to ascertain and assess the free-swimming periods of the more important organisms.

Sampling conditions shall include the various representative physical, chemical, and biological conditions which are known to exist during each quarter.

d. After species determination has been accomplished, demonstrate the effects of the installation and operation of the proposed power plant on the described aquatic biota.

5. Scenic, Scientific, and Recreation Resource Information

Descriptive statements in quantitative and qualitative terms should be provided by the utilities in their site selection report:

a. Existing recreation resources, activities, and facilities on the plant site and in the potential influence area of the power plant.

b. Proposed recreation resources, activities, and facilities that would be created or added on the site and in the potential influence area, including cooperative activities with adjacent landowners.

c. Recreation resources, activities and facilities that would be forfeited or impaired at the site and in the potential influence area.

d. Effects of proposed power plant, supporting facilities, and transmission lines on the landscape, scenic views, and other amenities of the site and potential influence area.

e. Effects on any areas of unique or superlative ecological or geological value.

f. Effects on any historical or archaeological objects or sites in the vicinity.

Inland Sites. Complete offstream cooling must be provided at all inland thermal power plant sites, including estuaries. This does not preclude, however, beneficial offstream uses of warmed water. It is also recognized that other adequately treated plant wastes may be discharged and that certain operation modes may result in short-term heat discharges. The following data will be necessary for evaluation of thermal power plant sites on fresh water streams and natural lakes.

1. Power Plant Data

a. Specific location of the site.

b. Description of other important water uses within three to five miles of the probable power plant intake or outfall locations.

c. Generating capacity (initial and ultimate); projected power generation schedules for representative years over the expected life of the project.

d. Fuel used and thermal efficiency.

e. Power plant intake/outfall design and location; also, screening and fish bypass facilities, cooling water pump types and sizes, and condenser cooling line sizes.

f. Cooling water requirements for alternate modes of waste heat treatment. Information should be presented to show that potential avenues for waste heat utilization have been seriously considered.

g. Treatment requirements for plant makeup water, if any.

h. Mode of fouling control in the intake/outfall conduits, the condenser cooling water lines, and the waste treatment facility.

i. Description of physical and chemical characteristics of general plant wastes, other than condenser cooling water, including methods of handling and disposal.

2. Physical Data

a. Meteorological data for the plant site. The following continuous records will be required at the plant site over a period of two years, for correlation with long-term regional data: wind speed and direction, air temperature, dewpoint, and solar radiation.

b. Stream cross-sections, at one-mile intervals, from one mile upstream to five miles downstream from the power plant site. Impoundment contours, where applicable, at five-foot vertical intervals.

c. Hydrographs of daily streamflows for median and ten-year recurring low-flow years; also, representative patterns of diurnal variation where the streamflow is subjected to regulation and/or tidal effects. These flows should be estimated for probable future flows if major changes in regulation conditions are expected. The need for these data will require the installation of one or more surface water gaging stations at or near the site if existing data are not adequate.

d. Continuous water temperature records over a period of two years at the power plant site, one mile upstream and five miles downstream. Special temperature surveys should be conducted to determine the presence and extent of temperature gradients affected by flow regulation, tides, or other causes. Thermographs in natural lakes should be placed at the plant site, mouths of major tributaries, and other selected points to establish the general temperature pattern for a period of two years.

3. Chemical Data

Chemical water quality surveys should be conducted every three months with cross-sectional samples taken at the plant site, one mile upstream and five miles downstream. For proposed site locations on natural lakes, samples should be collected at the surface and at ten-foot depth intervals at stations located at one-half mile intervals within the study area. Analyses included should define: (a) needs for plant makeup

water treatment requirements; (b) impact, relative to Water Quality Standards, of expected radioactive, chemical, thermal, sanitary, and miscellaneous plant waste discharges.

4. Biological Data

Careful documentation of the receiving water biota is essential, since Water Quality Standards were developed to protect this resource.

a. Description of the proximity of the power plant to major fish migration routes.

b. Inventory and seasonal occurrence of resident and migratory fish within five miles upstream and downstream from the power plant site.

c. Inventory and seasonal occurrence of the principal plankton at the power plant site.

5. Scenic, Scientific, and Recreation Resource Information

Descriptive statements in quantitative and qualitative terms should be provided by the utilities in their site selection report:

a. Existing recreation resources, activities, and facilities on the power plant site and in the potential influence area of the plant.

b. Proposed recreation resources, activities, and facilities that would be created or added on the site and in the potential influence area, including cooperative activities with adjacent landowners.

c. Recreation resources, activities and facilities that would be forfeited or impaired at the site and in the potential influence area.

d. Effects of proposed power plant, supporting facilities, and transmission lines on the landscape, scenic views, and other amenities of the site and potential influence area.

e. Effects on any areas of unique or superlative ecological or geological value.

f. Effects on any historical or archaeological objects or sites in the vicinity.

PRE-CONSTRUCTION AND OPERATIONAL MONITORING STUDIES

The above information will be used in evaluating the acceptability of a proposed site. A favorable evaluation means that the site characteristics are amenable to protection of the overall environment.

The purpose of the pre-construction and operational monitoring studies is to facilitate final waste treatment, intake and outfall design, and to document environmental effects of the operating plant. The general format of these studies will be similar to the preliminary studies, but will emphasize specific data at individual sites needed for plant design and operation decisions.

STATE LICENSING/PERMITTING CONSIDERATIONS

Evaluation of proposed thermal power plant sites must be carried on simultaneously by the Federal and State agencies. This requires coordination and an understanding of individual agency functions. This section describes current licensing and permitting procedures for each of the Pacific Northwest States as of the date of this document. It is informational only. Utilities should ascertain specific requirements and procedures directly from the pertinent agency.

Washington

The Thermal Power Plant Site Evaluation Council was created by legislative action in 1970. The Council is granted the authority to develop and apply topical guidelines in relation to the type, design, and location of thermal power plant sites and transmission line routes. It also has the authority to receive applications for site locations, investigate sufficiency thereof, contract for the independent study of thermal power plant sites and transmission line routes; to conduct public hearings on proposed locations of thermal power plants and associated transmission line routes; and to prescribe means of monitoring the effect of the construction and operation of such plants and connecting power lines to the Northwest power grid to assure continued compliance with the terms of certification.

The act provides that no thermal power plants with a generating capacity of 250,000 kilowatts or new associated transmission lines in excess of 200,000 volts to connect a thermal power plant to the Northwest power grid can be installed anywhere within the State of Washington without first obtaining certification.

The certification can be obtained only as a result of the following procedure: (1) application, (2) the payment by the applicant of a $25,000 fee for each site which shall apply to the payment of the cost of the study referred to below provided that, if the costs exceed a total of $25,000, the excess over that amount shall have the prior approval of the applicant, (3) commissioning by the Council of an independent study, to be financed by the

applicant, to measure the consequences of the proposed power plant on the environment of each site application, (4) an initial public hearing in the vicinity of the site within 60 days of the receipt of the application, (5) a public hearing or hearings conducted as a contested case prior to issuance of a recommendation to the Governor, (6) a report to the Governor by the Council of its recommendations as to the disposition of the application within 12 months of its receipt, or at such later time as is mutually agreed by the Council and the applicant. Within 60 days of the receipt of the Council's report, the Governor shall approve or reject the application for certification. If the application is approved by the Governor, the Chairman of the Council shall within 30 days submit a certification agreement for execution by the Governor and the applicant.

Oregon

Oregon has not as yet established a focal point for securing site certification and other permits needed for construction and operation of a thermal power plant. By executive order, the Governor has established a Nuclear Plant Siting Task Force. Considerable assistance can be obtained from this task force but it is still necessary to obtain a withdrawal permit from the State Engineer's Office for water, a discharge permit from the Department of Environmental Quality, and zoning changes, if necessary, from the County Commission in the county involved. The Governor is currently the final authority for a site certification.

Idaho

Idaho is studying procedures for site certification and permits for thermal power plants. At the present time, water withdrawal permits must be obtained from the Office of the State Reclamation Engineer. Discharges must conform to the State Water Quality Standards. Site certification is handled through the Office of the Governor with input from concerned State agencies.

Montana

Montana is working on streamlining procedures for site certification and necessary permits for thermal power plants. Under its present permit system, water withdrawals are handled by the State Water Resources Board and water and air discharge permits by the State Health Department. Site certification is handled through the Office of the Governor with input from concerned State agencies.

Individual Interior Agency Responsibilities

The Federal Water Quality Administration is directly concerned with the impact of thermal plants on water quality. At the present time, comments on the water quality aspects of an AEC license or USACE permit application for a thermal plant would be provided by the State agency or agencies concerned with the necessary certification relative to compliance with applicable Water Quality Standards. Except where Water Quality Standards of another state are affected, FWQA's activities would generally be indirect in assistance to the State agency. FWQA also advises and assists other Federal agencies

to insure that pollution does not result from project activities under Federal permit, license, loan, grant, or contract.

Site evaluation for nuclear power plants by the Geological Survey is an outgrowth of a Memorandum of Understanding between the Department of the Interior and the Atomic Energy Commission formalized in 1964. The Survey's function in that capacity is to review geologic and hydrologic information for the site, to call attention to phenomena that might affect the operation of the plant in such a way as to produce a safety hazard to the public or to the operating personnel. Typically, the Survey's reports will include a description of the geologic and hydrologic settings, seismic conditions, land slides, flood potential, probable maximum flood event, adequacy of water supply for cooling and other purposes, movement of contaminants, and like considerations. Thus, the Survey's attention is focused on hazards associated with catastrophic events, such as dam failure, earthquakes, and the likelihood of contamination of water supplies due to rupturing of radioactive waste storage tanks.

Several Interior agencies have responsibilities to review the impact of activities to be conducted under a Corps of Engineers permit. In particular, the FWQA, Bureau of Outdoor Recreation, National Park Service, Bureau of Commercial Fisheries, and Bureau of Sport Fisheries and Wildlife (and others as appropriate) would review the proposed permit with respect to the impact of the proposed construction or discharge in light of their missions and authorities. Under the Memorandum of Understanding between the

Secretaries of the Army and Interior which establishes this review procedure, the permit will not be issued at the regional level without the concurrence of the Interior agencies. If objections cannot be resolved at the regional level, the case will be referred to the Army Chief of Engineers for decision in consultation with the Secretary of the Interior.

In addition to the above, the Fish and Wildlife Coordination Act requires the prior consultation with the U.S. Fish and Wildlife Service (as well as with State fish and wildlife agencies) whenever any public or private agency proposes or is authorized to impound, divert, deepen the channel, or otherwise control or modify the waters of any stream or other body of water for any purpose under Federal permit or license.